PRODUCTION OF $O(^1D)$ IN THE RYDBERG STATES OF O_2 BY PHOTODISSOCIATION IN THE WAVELENGTH REGION 105-130 NM

P. C. LEE and J. B. NEE, *Department of Physics and Chemistry, National Central Univ., Chung-li, Taiwan, 320, R. O. C.*.

The metastable $O(^1D)$ produced in the photodissociation of O_2 in the Rydberg states lying in the wavelength region 105-130 nm were investigated. The detection of $O(^1D)$ was made by measuring the infrared emission at 762 nm from the transition $O_2(b^1\Sigma_g^+ - X^3\Sigma_g^-)$ produced by $O(^1D)+O_2$. The excited states of O_2 can be classified as either the $^3\Sigma_u^-$ states, which are correlated with $O(^1D)+O(^3P)$, or the $^3\Pi_u$ states, which are correlated with $O(^3P) + O(^3P)$.
Our studies resulted in the determination of the quantum yields for producing $O(^1D)$ for many bands of the E$^3\Sigma_u^-$ states. We assigned several series of Rydberg states, and found the mixing of the $^3\Sigma_u^-$ and $^3\Pi_u$ at some wavelengths. Furthermore, a band at 116.3 nm was observed to emit weakly in the visible region.